

Brain Cross Training

Fasting Practices for the Brain

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CONTENTS

Foreword	3
Hormesis and Vitagenes	4
Intermittent Fasting	5
Alternate Day Fasting	5
5:2 Diet	6
Recipes for 500-600 Calorie IF	7
Same Day Intermittent Fasting	7
25% Caloric Restriction (CR) Diet	8
Macros in Numbers	9
Optimal Weight Range	9
Recommended Calorie Tracking App	10
Tips for Successful Fasting	10

Foreword

My training is in cognitive neuroscience. I earned my doctorate from Carnegie Mellon and the University of Pittsburgh's flagship [Center for the Neural Basis of Cognition](#) program. I have since worked as a Lecturer/Assistant Professor at the University of Cambridge's [Experimental Psychology Department](#) – the top ranking Psychology Department in the top ranking University in the UK - where the basis of IQ Mindware's training program was devised.

In this series of eBooks I present you with the most effective, evidence-based cognitive interventions within a brain 'cross training' paradigm that combines computerized brain training with other strategies to improve brain health, resilience, performance and creativity.

Enjoy your training!

Mark



Mark Ashton Smith, Ph.D.

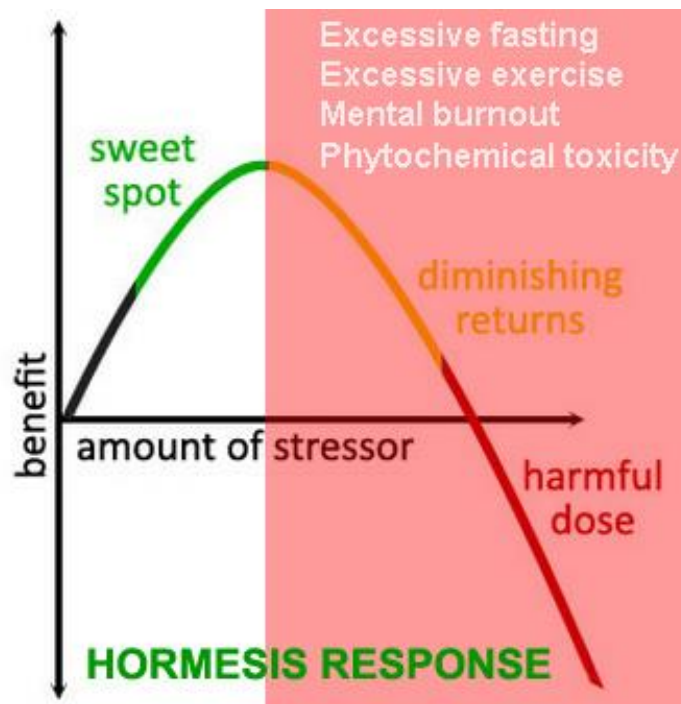
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Hormesis and Vitagenes

We have learned that stress – in the right doses and applied at the right times – is highly beneficial for the brain and body. We can harness it in brain cross-training programs using the **hormesis response**.



Without stress, the vitagenes and adaptive cellular stress responses don't kick into action to build resilience, health and better brain functioning.

In this eBook we will be looking at specific **fasting practices** that put you in the **hormesis sweet spot** to improve **neuroplasticity** for adaptive learning and **cell protection** for healthy brain cells.

Intermittent Fasting (IF)

Much of the research on the benefits of fasting have looked at constant caloric restriction – eating e.g. 25% less calories. Research shows that the same health giving and brain enhancing genetic pathways and biochemical responses activated by constant caloric restriction are engaged by intermittent fasting, even for relatively short periods of time.

[This review](#) and [this review](#) argue that “the reported beneficial health effects from caloric restriction... can be mimicked by alternating periods of short term fasting with periods of refeeding, without deliberately altering the total caloric intake.”

One of the most [comprehensive recent reviews of the benefits of caloric restriction](#) concludes:

“Incorporation of intermittent energetic challenges into our daily and weekly schedules should be a guiding principle for achieving optimal brain health. ...a prescription of CR and regular exercise will improve the health and longevity of the brain and body. Individuals who are overweight and sedentary must reduce their energy intake and engage in regular vigorous exercise in order to improve their brain health and reduce their risk for neurodegenerative disorders. Those of normal weight can expect to optimize the performance of their brain by CR and exercise.”

Intermittent fasting is similar to the availability-scarcity cycles of our evolutionary past. As with exercise and cognitive challenges, by periodically **triggering the adaptive cellular stress response we can benefit from the hormesis response.**

There are three popular varieties of intermittent fasting:

Alternate Day Fasting (ADF)

This requires **eating what you want one day, then cutting down to a quarter of your normal calories the next**. This amounts to around 500 Cal / day for women and 600 Cal / day for men.

Intriguingly, the research indicates that it might not matter much what proportion of fat you eat on non-fast days – although studies are limited. Dr Krista Varady of the University of Illinois at Chicago carried out an eight-week trial comparing two groups of overweight patients on ADF. She observed:

“If you were sticking to your fast days, then in terms of cardiovascular disease risk, it didn’t seem to matter if you were eating a high-fat or low-fat diet on your feed (non-fast) days”

5:2 Diet

This is a less intensive and often more practical version of ADF. **Five days a week you eat normally and then for two days a week what you do is you cut down to a quarter of your normal calories as in ADF.**

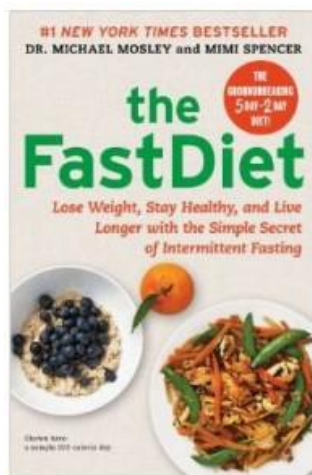
The 5:2 diet has been popularized by the Michael Mosley in the [BBC Horizon program Eat, Fast and Live Longer](#) (also given a BBC feature [here](#)). The feature is well worth a watch for an introduction to the science between restricted diet and intermittent fasting.



Michael Mosley having his health assessed before starting his 5:2 intermittent fasting diet. [Click for video.](#)

Recipes for 500-600 Calorie Intermittent Fasting

Michael Mosley's book [The Fast Diet](#) is recommended if you want a practical plan for adopting alternate day fasting or the 5:2 diet. You can download it in an instant to your Kindle. Examples of the fasting day diets are:



Breakfast: 1 boiled egg, half a grapefruit (125 calories)

Dinner: vegetarian chilli (378 calories)

Breakfast: Porridge with blueberries (197 calories)

Dinner: Chicken stir fry (306 calories)

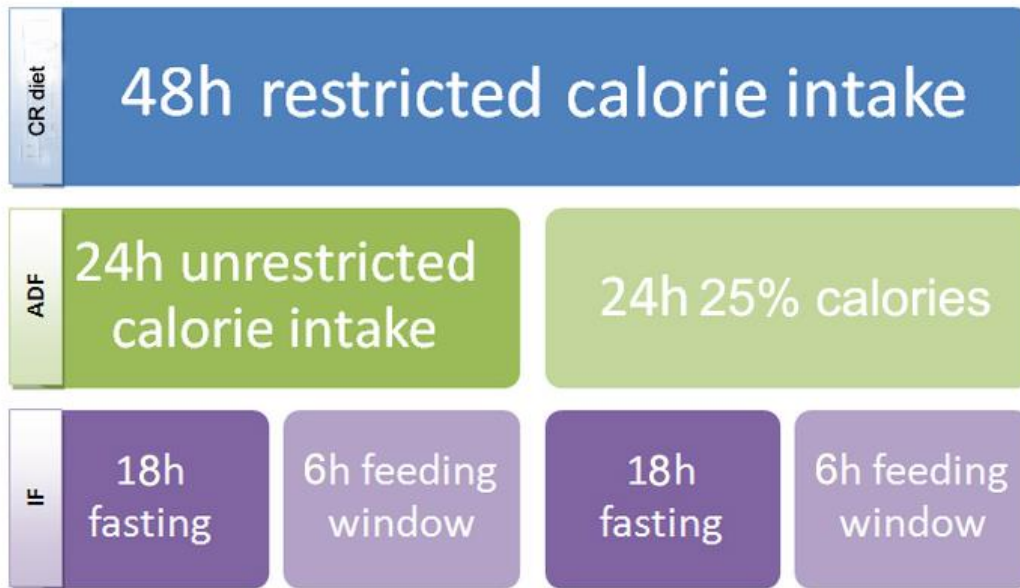
Breakfast: strawberry smoothie (171 calories)

Dinner: Oven-baked smoked haddock (325 calories)

Same Day Intermittent Fasting

This is another popular intermittent fasting variant - eating only during a short time window each day (e.g., not eating breakfast or lunch). One version of same day intermittent fasting has been adopted in [Bulletproof Intermittent Fasting](#). In this diet, you eat freely between 2pm and 8pm and fast for the remaining 18 hours in a day. Less research has been conducted looking directly at same-day intermittent fasting, but it triggers the same adaptive cellular stress response as CR and ADF.

Calorie Restricted dieting, alternate day fasting and same-day intermittent fasting schedules over a two day period are shown in the diagram.



25% Caloric Restriction (CR) Diet

An alternative to intermittent fasting is absolute caloric restriction. Most of the animal studies on caloric restriction involve **cutting daily calorie intake by 25%** while ensuring that the diet has the recommended micronutrients. With CR diets, calories are reduced but essential nutrients are maintained. This is the diet adopted by individuals in the [CALERIE](#) study. And this is what [CRON](#) (Calorie Restriction with Optimal Nutrition) dieters are doing in their thousands.

A good starting point to get you underway with a CR diet if you consider it a practical option is the [Painless Calorie Restriction for People Who Love to Eat](#). The information on this site follows CALERIE guidelines, such as:

- Sticking to the most nutrient-dense foods like fruits, vegetables, whole grains, and legumes--although the CALERIE study is not vegan or vegetarian.
- Eating foods that are filling, appealing, low in calories, and nutrient-rich.
- Eating lots of fibre--at least 50 grams a day without counting grams. Fibre is key to keeping satisfied and full - and it likely activates the satiety receptors in the lower intestine.



A 1500 Calorie Day

Macros in Numbers

[To calculate your required calorie intake, you can use this online calculator.](#)

Simply multiply your recommended Calories (to maintain current weight) by 0.75.

[To get your macro breakdown, feed this diet-restricted number into this calculator](#), setting your protein intake to no more than 10% if you consume animal proteins. For instance, 55% carbohydrates, 10% proteins, and 35% fats. The exact carb-fat ratio is something you could experiment with. The research does not have a clear recommendation here. See Appendix 1 for a more radical low carb diet plan.

If you consume mainly vegetable proteins and want a higher protein diet a 55/15/30 or 50/20/30 ratio may be preferred. **Higher protein intake is recommended if you are over 65 or high a highly active lifestyle.**

Optimal Weight Range

Being underweight - just like being overweight - can result in negative health and cognitive outcomes. Excessive caloric restriction - putting you in the 'red

zone' of the hormesis response – results in muscle wasting, bone mineral density reduction, libido lowering, general malaise. [And being underweight long-term in adulthood and weight loss late in life is associated with poorer cognitive outcomes.](#)

There seems to be a window for energy intake and expenditure that promotes optimal health and brain function. An energy balance that results in a BMI (body mass index) between 20 and 24 appears to be optimal for most people eating Western diets. Ensure that you remain within this window while practicing caloric restriction or intermittent fasting.

[You can calculate your current BMI here](#)

Recommended Calorie Tracking App

Adopting an intermittent fasting or CR practice benefits a lot from continual feedback on calorie consumption.

MyFitnessPal

This app allows users to log food from anywhere and has a food database of 3,282,000 different kinds of foods to choose from. Customized recipes can be added to the database. The app database tracks calories as well as basic macronutrients, vitamins and minerals, providing feedback on any nutrient deficiencies. The app's calorie counter is essentially an online diary of each user's intake. It allows users to set daily goals, and the app can add multiple foods at once. It also automatically stores food and meals that members eat often, which makes them easy to find when they eat them again and need to log them.

Tips for Successful Fasting

- Experiment with different fasting programs to find out which are practical and can be incorporated into your weekly routine. These diets should be thought of as a long-term lifestyle change – not a temporary diet plan. It is for this reason that permanent **caloric restriction (e.g. 20-25%) diets are not recommended**, as they tend to be unsustainable in the long-term.

- The diet should, after a couple of weeks, be helping you feel “**more energy, more bounce, a greater zest for life**” in the words of Dr Michael Mosley. If you are feeling fatigued, over-stressed, or run down, or are experiencing disruptive swings in mood and energy levels, then the diet is likely to be going into the bad end of the **hormesis response**, and you should suspend the diet until there is full recovery, and then try again at a lower intensity. For women, the effects of being overstressed from fasting may be more dramatic.
- You may need to develop a **tolerance for feelings of hunger** on fasting days – which in itself is not a negative.
- If you skimp on essential nutrients, you will cause the kind of system breakdown that you are trying to build resilience to – leading, for instance, to insulin resistance or vitamin deficiency.
- Related to the above, combining fasting with intense exercise may result in a **stress-reactivity response**, with sleeplessness and anxiety. I would recommend stocking up with a high carb meal the evening before endurance workouts, and ensuring that on the training day you are also well fuelled with carbs.
- **Ensure that you don’t become weaker through muscle loss.** Maintain at least 0.8 grams of (complete) protein per kilogram of body weight – e.g. 64 g for a 80 kg man (i.e. 256 calories) ; 45 g for a 56 kg woman (180 calories).
- **Drinking coffee may be beneficial for fat-burning**, especially during a fast. [One study found that an infusion of epinephrine \(a hormone that coffee increases\) during 48 hour fasting up-regulated fat-burning and metabolism.](#) Epinephrine also **lowers appetite**, which can be helpful for people trying to stave off hunger during a fast.
- **Avoid alcohol during fasting.** The inebriating effects of alcohol are more pronounced during fasting, and alcohol is itself relatively high in calories.

- **Meditation on fasting days is recommended.** Mindfulness meditation before sleep on fasting days helps counteract stress-reactivity, and helps with overall adaptation to prolonged intermittent fasting.
 - **Phytochemical consumption on fasting days is recommended.** The health and cognitive benefits of phytochemical-rich nootropics such as green tea, blueberries, and Turmeric may be heightened when the adaptive cellular stress response is already activated by fasting.
 - **High Intensity Interval Training (HIIT) is recommended for fasting days.** Based on the same principle of brain cross training synergy, combining briefer periods of high intensity workouts with fasting may be a highly beneficial strategy. Experimentation is needed, to ensure that this doesn't result in an unhealthy stress-reactivity outcome.
 - **Intensive computerized brain training** (e.g. IQ Mindware apps) may also act synergistically with fasting, with greater neuroplasticity and brain health benefits when the adaptive cellular stress response is already primed.
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IQ Mindware Apps

If you are interested in finding out more about the IQ Mindware app **i3** for brain performance and resilience, you can do so at [this website](#).

Combining fasting with effective computerized cognitive training such as **i3** can result in a **brain training synergy** for extra benefit.